TC 184/SC 4   VOTING BEGAN ON/DEBUT DU VOTE:1998-11-26
ISO/DIS 10303-210   TIME LIMIT FOR REPLY/DELAI:1999-04-26

TITLE: Industrial automation systems and integration -- Product
       data representation and exchange -- Part 210: Application
       protocol: Electronic assembly, interconnection, and
       packaging design

TITRE: Systèmes d'automatisation industrielle et intégration --
       Représentation et échange de données de produits --
       Partie 210: Protocole d'application: Interconnexions
       électroniques, assemblage et conception d'emballage

MEMBER BODY/COMITE MEMBRE	APPROVAL/APPROBATION	DISAPPROVAL/DESAPPROBATION	ABSTENTION		MEMBER BODY/COMITE MEMBRE	APPROVAL/APPROBATION	DISAPPROVAL/DESAPPROBATION	ABSTENTION	
Australia (SAI)	P	X			Netherlands (NEN)	P	X		
Brazil (ABNT)	P				Norway (NSF)	P			
Canada (SCC)	P				Portugal (IPQ)	P		X	**
China (CSBTS)	P				Russian Federation (GOST R)	P			
France (AFNOR)	P	X		*	Spain (AENOR)	P			
Germany (DIN)	P	X		*	Sweden (SIS)	P	X		
Italy (UNI)	P	X			Switzerland (SNV)	P		X	**
Japan (JISC)	P	X			United Kingdom (BSI)	P		X	**
Korea, Republic of (KATS)	P	X			USA (ANSI)	S	X		*

                                    T O T A L   9   3
                                                        0

* = Comments / commentaires
** = P-member having abstained and therefore not counted in the vote /
     Membre (P) s'abstenant de voter; n'est donc pas compté dans le vote

P-MEMBERS VOTING:	IN FAVOUR OUT OF	REQUIREMENT
	9	9 = 100.00%	>= 66,66%
MEMBRES (P) VOTANT:	EN FAVEUR SUR	CRITERE

MEMBER BODIES VOTING:	NEGATIVE VOTES OUT OF	REQUIREMENT
	0	9 = 0.00%	<= 25%
COMITES MEMBRES VOTANT:	VOTES NEGATIFS SUR	CRITERE

THIS DRAFT HAS THEREFORE BEEN APPROVED
in accordance with the ISO/IEC Directives, Part 1, sub-clause 2.6.3.

CE PROJET EST DONC APPROUVE
selon les Directives ISO/CEI, Partie 1, paragraphe 2.6.3

FRENCH BALLOT
on ISO/DIS 10303-210

Annex

FRANCE approves the technical content of ISO/DIS 10303-210 with the comment herewith.

Comment:

We strongly support the integration effort initiated with Application Protocol 212 (doc. JWG 9 N 13-98).

<u>Note:</u>
Application Objects definitions should not simply reiterate EXPRESS-G description but actually describe the modelled concept
(e.g., Interconnect_module_component: the only definition given here reiterates the sub-type relationship and the subsequent note only provides examples).

German vote and comments
on
ISO/DIS 10303-210

The German vote on ISO/DIS 10303-210 is: **YES,** with comments
Germany has identified 5 issues.

ISSUE NUMBER: GER-210DIS-1
AUTHOR: Lothar Klein
CLAUSE: 5.2 AIM short form
CLASSIFICATON: minor technical
DESCRIPTION:
  Refer to the latest available versions of the integrated
  resources, especially IR42 Version 2.
PROPOSED SOLUTION:

ISSUE NUMBER: GER-210DIS-2
AUTHOR: Lothar Klein
CLAUSE: 4.2
CLASSIFICATON: editorial
DESCRIPTION:
  For every application object in claus 4.2 add the
  corresponding ARM Express specification as a note.
PROPOSED SOLUTION:

ISSUE NUMBER: GER-210DIS-3
AUTHOR: Lothar Klein
CLAUSE: 4
CLASSIFICATON: minor technical
DESCRIPTION:
  Do not use the presentation entities styled_curve_occurence
  and styled_area_occurence from IR46. They are defined
  for presentation, but AP210 needs representation.
PROPOSED SOLUTION:
  Instead of styled_area_occurence use half_space_2d
    from IR42.2.
  Instead of styled_curve_occurence use either
  a) definitional_representation and stretching mapped_item
  b) have a new entity in p42.2 to define wide curves
  c) use a shape_representation for the centerline curve and
    a representation with descriptive_representation_items
    for the curve styles and a length_measure_with_unit for the
    curve width. Relate this 2 representations with a
    shape_aspect_relationship.

ISSUE NUMBER: GER-210DIS-4
AUTHOR: Lothar Klein
CLAUSE: 5.1 Mapping of RULE_SUPERSEDENCE
CLASSIFICATON: minor technical
DESCRIPTION:
The mapping of the ARM object RULE_SUPERSEDENCE is not clear.
It seems that 2 instances of rule_action are required.
This needs to be checked with the mapping guidelines.
PROPOSED SOLUTION:

ISSUE NUMBER: GER-210DIS-5
AUTHOR: Lothar Klein
CLAUSE: 5.1 Mapping of PLUS_MINUS_TOLERANCE_RANGE_REPRESENTATION
CLASSIFICATON: minor technical
DESCRIPTION:
The mapping of the ARM object
PLUS_MINUS_TOLERANCE_RANGE_REPRESENTATION is not clear.
It seems that it is mapped to 2 instances, a
shape_dimension_representation and a plus_minus_tolerance,
simultaneously.
This needs to be checked with the mapping guidelines.
PROPOSED SOLUTION:

Subject: USA vote on ISO/DIS 10303-210
Date: Wed, 21 Apr 1999 15:56:58 -0400
From: Maryse Depas-Medina <mmedina@ANSI.org>
Reply-To: ISOT <ISOT@ANSI.ORG>
To: 'ISO CS - US votes' <votes@iso.ch>
CC: "'Stacy R. Watts'" <watts@aticorp.org>

REF: ISO/TC 184/SC 4

The United States vote to Approve with Comments on document ISO/DIS
10303-210.   See attached.

 <<210_DISComments.doc>>

Best regards,

Maryse Depas-Medina
For the ANSI ISO Team

You may contact the ISO Team by:
Telephone: +1 212 642 4946 (Direct Line: Henrietta Scully, ISO Team
Manager)
Fax: +1 212 730 1346
Internet: isot@ansi.org <mailto:isot@ansi.org>

	Name: 210_DISComments.doc
210_DISComments.doc	**Type:** Microsoft Word Document (application/msword) **Encoding:** x-uuencode

```
================================================================

Issue ............ USA-210 DIS-1
Title ............ ee_product_version to ee_approval
Author ........... USA
Clause ........... 5.1
Classification ... Editorial

---- Description ----------

The mapping table claims that there is an assertion
"ee_product_version to ee_approval (as life_cycle_status)" which
would imply that "ee_product_version" has the following attribute
definition:
    life_cycle_status : ee_approval;
According to the 299.36 schema, "ee_product_version" has the
following attribute definition:
    life_cycle_status : life_cycle_stage;
where "life_cycle_stage" is an enumeration.


---- Proposed Solution ----

Change the reference to "life_cycle_status".  Change the
reference from an assertion to an attribute.  Change the aim
element column to approval.level and update the reference path so
that is the target.  Update the mapping table.


================================================================

Issue ............ USA-210 DIS-2
Title ............ Fiducial in Package UoF
Author ........... USA
Clause ........... 4.2
Classification ... Editorial

---- Description ----------

There is an erroneous entry in the list of Application objects in
the package UoF.  Fiducial is called out incorrectly.
Fiducial_part_feature is the correct entry.


---- Proposed Solution ----

The UoF, mapping table for the UoF and clause 6 will need update.
No impact to arm, aim, or actual mapping of the fiducial or
fiducial_part_feature objects.


================================================================

Issue ............ USA-210 DIS-3
Title ............ Resource part entities omitted by shtolo
Author ........... USA
Clause ........... 5.1
```

Classification ... Editorial

---- Description ----------

Testing some improvements to our EXPRESS compiler, we found some
entities that are mentioned in various TYPEOF etc. statements,
but are not present in the AP210 AIM long form. Most of these
come from Part 46, I think. Are they supposed to be missing, or
is shtolo failing to bring them in?

---- Proposed Solution ----

Several of the errors were typos and misspelling; some
required slight modifications to satisfy rules.

===

Issue USA-210 DIS-4
Title .... unit of measure requirements
Author .... USA
Clause 5.2
Classification ... Editorial

---- Description ----------

Attached you will find a chunk of an AP210 BOM file. My question
is: what should the character string in line #109 be? I used
"pieces" for a place holder. A COUNT_MEASURE requires a unit of
measure, as does a DESCRIPTIVE_MEASURE of 'as_required', but I
have not been able to find a recommended practice (AP210/AP203)
that indicates what this unit of measure should be.

---- Proposed Solution ----

The missing rule in 210 short and long form,
assembly_material_composition_relationship_constraint, will
implement the constraints called out in the ARM application
object Assembly_material_composition_relationship.

If the pdr.name = assembly_material_composition, then the units
has to be one of {length, volume, area, amount of substance}.
(This is independent of the value of descriptive_measure.)

Note that 'as required' is only allowed for bulk material in
210.

===

Issue .... USA 210 DIS-5
Title .... mapping of Supplied_product_version
Author .... USA
Clause 5.1
Classification ... Minor Technical

---- Description ----------

There is inconsistency in the mapping tables for several
attributes of Supplied_product_version; some point to the "design
organization" and some point to the "part supplier".

---- Proposed Solution ----

1) Supplied_product_version and Certification --
Deprecate the aim entity supplier_part_relationship copied from
203. Establish the basic relationship through the
product_definition_formation_relationship entity from 41 and the
PDM schema. Update the mapping table entries.
----
2) Physical_unit_usage_view.approved_part --
This attribute establishes an optional many to many relationship
between a product definition and a product_definition_formation
in an attempt to capture the data for a spec or source control
drawing. This relationship is already captured in the
Supplied_product_version.supplied_product_version attribute.
Delete the Physical_unit_usage_view.approved_part attribute.
Delete the assertion from the mapping table.

==

Issue USA-210 DIS-6
Title .... reference path for
material_designation_characterization.property
Author .... USA
Clause 5.1
Classification ... Editorial

---- Description ----------

The reference path for the assertion 'ee_material to
coordinated_characteristic (as coordinate_material_property)' contains
the following subpath:
   material_designation_characterization.property ->
   characterized_material_property
   characterized_material_property = material_property
material_property is not one of the possible values for the select
characterized_material_property.
What should the path be?

---- Proposed Solution ----

The path should be:
material_designation <-
material_designation_characterization.designation
material_designation_characterization
material_designation_characterization.property ->
characterized_material_property
characterized_material_property = material_property_representation

```
material_property_representation <=
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item =>
(measure_representation_item)
(coordinated_representation_item)
```

===

```
Issue ............ USA-210 DIS-7
Title ............ Bare_die mapping to Technology
Author ........... USA
Clause ........... 5.1
Classification ... Editorial
```

---- Description ----------

```
physical_unit.unit_technology: OPTIONAL technology;
maps as:
physical_unit <=
product_definition
characterized_product_definition = product_definition
characterized_product_definition
characterized_definition = characterized_product_definition
characterized_definition <-
property_definition.definition
{property_definition
property_definition.name = 'unit technology'}
property_definition
----------------------------------------
bare_die.unit_technology: technology;
maps as:
bare_die <=
physical_unit <=
product_definition
characterized_product_definition = product_definition
characterized_product_definition
characterized_definition = characterized_product_definition
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_relationship.related_property_definition
{property_definition_relationship
property_definition_relationship.name = 'device unit technology'}
property_definition_relationship
property_definition_relationship.relating_property_definition ->
{property_definition
property_definition.name = 'unit technology'}
property_definition
======================================
-- Comment:  these mappings should be the same.
```

---- Proposed Solution ----

Correct the mapping table so that the mapping for
bare_die.unit_technology is identical to the mapping for
physical_unit.unit_technology. Also, add "<= material_property"
after property_definition in both mappings.

===

Issue USA-210 DIS-8
Title .... omissions of
dimension_related_tolerance_zone_element
Author .... USA
Clause .... 4.2 and 5.2
Classification ... Editorial

---- Description ----------

In the design_management UoF mapping table a reference path for
ARM element MANAGED_DESIGN_OBJECT could be:
(managed_design_object =
dimension_related_tolerance_zone_element)
... but in the Express listing the definition of
managed_design_object does not include
dimension_related_tolerance_zone_element
Also, similar for AIM element datum_reference.
These two elements are defined in part 47. Likewise for ARM
application object FROZEN_DESIGN_OBJECT.

---- Proposed Solution ----

Correct these omissions.

===

Issue USA-210 DIS-9
Title .... cartesian_transformation_operator_2d
Author .... USA
Clause 5.1
Classification ... Editorial

---- Description ----------

Summary: there is a redundant mapping table constraint in the
reference paths that requires the
cartesian_transformation_operator_2d to be referenced as a member
of 'items' by a shape_representation.

Background: The 'using_representations' constraint in
geometric_rep_item requires that a cart..operator be referenced
by a shape_rep. This 'using_representations' constraint is the
reason the mapping constraint is in the reference path.

Problem: This mapping table constraint causes part 21 files
written by code based on mapping tables to not be in compliance

with a rule in the subtypes of shape_rep used in 210.

Assessment: Examination of the 'using_representations' semantics
indicates the intent is met by the inclusion of the mapped_item
that references the cart..trans..operator in the shape_rep and
that it is unecessary to also directly include the
cart..trans..operator in the 'items'. Since the mapping table
constraint is redundant, and if permitted to stay in, would cause
an internal inconsistency in the standard, this is an error.
Errors are required to be corrected at FDIS. The 210 project
will record the error during ballot cycle. This error is
'minor'.

---- Proposed Solution ----

Remove all occurrences of this mapping table constraint. No
schema changes are required and no changes required anywhere
other than the mapping tables.

===

Issue USA-210 DIS-10
Title .... ARM Curve and Planar_Curve mappings inconsistent
Author .... USA
Clause 5.1
Classification ... Editorial

---- Description ----------

In the mapping table (82) for Shape UoF, the ARM Curve maps to an
AIM Curve (subtype of GmRpIt) but the ARM Planar_Curve maps to an
unrestricted AIM Shape_Representation. Since the ARM
Planar_Curve is a subtype of the ARM Curve (with nothing added),
I would expect the ARM-AIM mappings to be similar for these two
entities. Is this an error? If not, please explain why one maps
to a Rprsnt while the other maps to a RprItm.

---- Proposed Solution ----

Allow an alternative mapping of curve to a shape_representation.

===

Issue USA-210 DIS-11
Title .... component_location wrl compile errors
Author .... USA
Clause 5.2
Classification ... Editorial

---- Description ----------

When I tried to compile the 15 Dec 98 version of the AP210 AIM EXPRESS
(using the ITI PDE/Lib "exp2ddf"), I got the following error msgs.

```
ap210.exp:2412: --ERROR: Reference to undefined attribute description.
ap210.exp:2411: --ERROR: Reference to undefined attribute description.
Here is the portion of the EXPRESS it's complaining about:
  ENTITY component_location
    SUBTYPE OF (representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* SELF.items | (((
              'ELECTRONIC_ASSEMBLY_INTERCONNECT_AND_PACKAGING_DESIGN.'
+
              'DESCRIPTIVE_REPRESENTATION_ITEM') IN TYPEOF(it)) AND
(it.
2411>         name = 'placement fixed') AND ((it.description = 'true')
OR
2412>         (it.description = 'false'))) )) = 1);
```

---- Proposed Solution ----

replace a section of the rule with:
'DESCRIPTIVE_REPRESENTATION_ITEM') IN TYPEOF(it)) AND
(it\representation_item.name = 'placement fixed') AND
((it\descriptive_representation_item.description = 'true') OR
(it\descriptive_representation_item.description = 'false'))))) = 1);

==

Issue USA-210 DIS-12
Title .... geometric_tolerance_with_specified_datum_system
Author .... USA
Clause 5.2
Classification ... Minor Technical

---- Description ----------

In the AP 210 AIM,
geometric_tolerance_with_specified_datum_system (gtwsds) is a
subtype of physical_unit_geometric_tolerance(pugt), which is a
subtype of part 47 geometric_tolerance (gt) AND of part 41
property_definition (pd). Giving gtwsds the multiple supertypes
of gt and pd causes gtwsds to inherit additional attributes from
pd. Other APs do not have the pd supertype structure in their
ARMs, and so their equivalent of gtwsds is fundamentally
different. This difference means we cannot harmonize the GDT
concepts in 210 with those in the other APs. Yet it seems clear
that AP 210 meant to introduce the same basic geometric
tolerancing concepts as 214 and 224 because the geometric
tolerance types which are the names of subtypes of gtwsds are
identical to those used in subtypes of the corresponding 214 and
224 entities.

---- Proposed Solution ----

Replace physical_unit_geometric_tolerance with
geometric_tolerance (part 47 or 519). Replace
geometric_tolerance_with_specified_datum_system with

geometric_tolerance_with_datum_reference (part 47 or 519). If it
is necessary to assign property, find a different way to do it.
(This different way might most elegantly be accomplished with a
concept completion structure, as in the use of a select type
which includes the names of all entities requiring the
property_definition association, and an associative entity which
points both to this select type and to property_definition.
Unfortunately, this seems not only to have not been available
when this mapping was first done, but also unavailable in the
second edition integrated resources.)

==

Issue USA-210 DIS-13
Title .... physical_unit_datum, etc.
Author .... USA
Clause 5.2
Classification ... Minor Technical

---- Description ----------

physical_unit_datum, physical_unit_datum_feature, and
physical_unit_datum_target are AP 210 AIM specializations of
shape_aspect. datum, datum_feature, and datum_target, which are
defined in part 47, are also specializations of shape_aspect.

---- Proposed Solution ----

Replace physical_unit_datum with datum, etc (part 47 or
519).

==

Issue USA-210 DIS-14
Title .... mapping table reference path corrections
Author .... USA
Clause .... 4.2 and 5.2
Classification ... Editorial

---- Description ----------

In preparation for the FDIS document, I scanned the reference
paths and compared all attribute names to those in the DIS
document. The enclosed list identifies those entity and
attribute mispellings.
----
erroneous aim element names:
----
product_definition_representation.definition undefined
product_definition_representation.used_representation undefined
----
erroneous attributes:
----
product_related_product_category.product undefined

```
property_definition_representation.used_definition undefined
representation.description undefined
representation.item undefined
representation_context.text undefined
shape_aspect. undefined
shape_aspect_relationship.related_product_definition undefined
shape_aspect_relationship.relating_product_definition undefined
```

---- Proposed Solution ----

There are no changes required to clause 5.2 or the aim. Details
of the corrections actually applied to the wt2 files are
incorporated in RCS and will be extracted when we generate an
issue log document.

==

Issue USA-210 DIS-15
Title .... 210 subtype mandatory shape rep rule
Author .... USA
Clause 5.2
Classification ... Editorial

---- Description ----------

AP210's subtype_mandatory_shape_representation rule requires a
specific subtype of shape rep for shape_aspect and
shape_aspect_relationship; AP203 has no such rule. To enable
interoperability, the AP210 rule needs to be modified.

---- Proposed Solution ----

Edits to the rule have been identified that will solve
this problem.

==

Issue USA-210 DIS-16
Title .... Curve_style mapping problem
Author .... USA
Clause 5.1
Classification ... Minor Technical

---- Description ----------

The arm application object Curve_style mapping is incomplete.
Part 46 does not completely support the domain requirements when
a Curve_style is referenced by the arm object Trace_template.

---- Proposed Solution ----

Rework the mapping to implement the data requirements of

Curve_style corner and end styles that support
Conductive_interconnect_element with descriptive representation
items. Leave the current mappings to support references to
Curve_style other than Trace_template.

===

Issue USA-210 DIS-17
Title .... Array_placement_group AO needs attributes
Author .... USA
Clause 4.2
Classification ... Minor Technical

---- Description ----------

The arm application object array_placement_group provides no
specific data.

---- Proposed Solution ----

Modify the arm to allow the explicit data associated with
Array_placement_group to be specified (i.e.:add the data
attributes to Array_placement_group, but do not change the
semantics of Text_string_component; this will require minor
restructuring of the arm supertype tree, but will have no impact
on the mapping of existing arm application objects other than
Array_placement_group).

===

Issue USA-210 DIS-18
Title .... Rules regarding string constants
Author .... USA
Clause 5.1
Classification ... Editorial

---- Description ----------

For the most part, string constants in the AP210 mapping table are
lowercase, with the following exceptions:
"BOTTOM"
"CENTER"
"TOP"
"LEFT"
"RIGHT"
"AVERAGE"
"FREE STATE"
"EACH ELEMENT"
"EACH RADIAL ELEMENT"
"MAJOR DIAMETER"
"MINOR DIAMETER"
"NOT CONCAVE"
"NOT CONVEX"
"PITCH DIAMETER"
I could not find any rules in the AIM EXPRESS that use any of these

---- Proposed Solution ----

Change the figures accordingly.

===

Issue USA-210 DIS-29
Title .... Correction to description of Via_terminal
Author .... USA
Clause 4.2.743
Classification ... Editorial

---- Description ----------

"...that geometrically is a hollow cylinder with some
thickness..." should be "...that geometrically approximates a
hollow...." The wall of the plated cylinder is not true and
even.

---- Proposed Solution ----

Change the text accordingly.

===

Issue USA-210 DIS-30
Title .... mapping design_layer_stratum entities in complex
situations
Author .... USA
Clause 4.2.652, 6.24
Classification ... Editorial

---- Description ----------

It is not clear how design_layer_stratum entities (e.g., Fig.
100 - the layup/stackup design intent as I understand it) are
mapped to interconnect_module/usages entities (their physical
realization) in complex situations. For example, a single
dielectric stratum may be physically realized as two 1080 prepreg
sheets or a mixture of three prepreg sheets (e.g., two 1080s, one
2116). An inverse case is where three strata (two conductors,
one intermediate dielectric) get physically realized as a single
laminate. Note the roles can be reversed in cap vs. foil-style
layups. Similar cases are illustrated in Figure 6 of the
following paper:
http://eislab.gatech.edu/pubs/conferences/interpack97-peak/html/

A somewhat oddball but practiced case may also occur (especially
when there are an odd number of conductive layers): one
conductive side of a laminate may be 100% etched away/absent and
combined with one or more prepreg sheets. Thus the dielectric
stratum is realized by a combination of the prepreg sheets and
the C-stage prepreg from the laminate.

These type of *design* decisions are typically made by pwb
fabricators during their manufacturing planning stages and affect

things such as post lamination thickness, warpage, and
delamination. However, today such information is typically not
exchanged between designer & fabricator. Thus including this
type of information as an AP210 conformance class (which the
designer & fabricator may exchange), as has been done, is a
distinctive and necessary capability in AP210.

---- Proposed Solution ----

Based on discussions and examples with Tom Thurman, it appears
the current entities can handle these cases, but how to represent
them should be at least part of a recommended practices document.
Figures/instances like our Fig. 6 that take Fig. 100 and show
several possible physical realizations would be helpful and
should include basic cases like those identified above.

==
-- the end --